

Supporting information for Kusche *et al.* (2002) *Proc. Natl. Acad. Sci. USA*, 10.1073/pnas.152241199

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MjaPPO -----MNIEQQQLLYLFELPQEPLNRPKGGSVLF-VLEND-----DTPPLVTTRI--AGSPSIKLQVP
PlePPO MQVTQKLLRRDTEMADAQKQLLYLFERPYDPINAPRADGSLFLY-AVAGA-----DT--VATRF--GVAPTSVTVP
PmPPO -----MANDQQRLLYLFELPQEDIQAPRPGGSVLF-KLES-----EAPPSVATRV--GVSPSVNLPVP
TmPPO -----MASKKNIL-LLFDRPREPVFIAGSKKAVF-SVPNEYLADKYK-PLGVALTNRF--GEDADERIDVK
GmPPO -----MSDKSRLLLFFDRSEPCFLQKGDDNVAF-EVDHYYSDKYK-SLTNTLNRF--GSGEVRTIPVK
SbuPPO2 -----MSKETNKIALALLFDRPLEPVFTARDGKAVF-DLPESYNEQYV-DVKDEIQTFRF--SBDVDIKIPLR
SbuPPO1 -----MADKHDL-LLFERPNEPVFMKGKTITVF-DIPDKFLTDYRYR-PIGSEVQSRF--GEKAEKRIPKV
EpiHc -----MPSTSQQKEVLDFFNPETRVRVSRAKQKDQPSVIFK-----MPSTA-EKQRRIL-PFFQFTSLSTKD-KFGILVQRD
EcaHcB -----MPSTA-EKQRRIL-PFFQFTSLSTKD-KFGILVQRD-----
EcaHcC -----MPSDANEMQARLL-QFEHSTLSTKA-KFGLRVIRD-----
EcaHcA -----M-TILHDQKVQAL-KLFKEKLSVAAATG-EPVPADQID-----
EcaHcD -----MTIADHQARIL-PLFKKLTSLSLPD--PLPEAERD-----
EcaHcE -----MPDKQKQLRVI-SLFEHMTSINT--PLPRDQID-----
EcaHcF -----MTVQDKQRQIL-PLFEHLSLSTRG--GLDRTESD-----
EcaHcG -----MASIPEKQALIL-PLFEKLTSLTK--TPPRAQWD-----
SpiHc1 -----MKLFILAVVLLATTIAEAKCP-KPVNVEAKQKMDV-TIISYINKPANP--VPPKPPID-----
ScoHc1 -----MWSLATLTFVLGTVIRADQCPVPAUTDKDLEKIL-ELIGHVNRPLTP--ETPEPAGY-----
ScoHc2 -----MDTRVRLRLTLALVALSGVLADESSESSAIVNDYKLKQKEIQ-HLVDTINKPVYP--DFKDTRGI I-----
HamHcA -----TLVAAAAPWPSFSYQNDASGDSTAKRQDGVN-HLLDRIYDHLY-SDLKQISETFSPEADTSMYTDGG
PinHcA -----ADLGNTAQKQDGIN-HLLDCKIYEPTKY-PDLKDIAENFPNLGDTSYNDHG
PelHc1 KVLVLCALVATAAAWPSFSGELTNGFQSDVHSNDNAHQKQDVN-HLLDCKIYEPIKD-EELHNIAQTFDPVADTSIYGDVG
CsaHc -----MKLLLLCALVAGASAWPNGMMADSPGGASNAQKQHDVN-SILWKVYEEIRD-PHLKELSQSFDPL--SGHYDDG
PvaHc -----MRVLVVLGLVAAAQFVASADVQQQKDVL-YLLNKIYQDID-QDLLATANSFDPVGVLGGSYSDDG
PinHcC -----ADCQAGDSACKLAQKQHDVN-YLVYKLYGDIRD-DHLLKELGETFNPQGDLLLYHDNG
SamHc -----MRLMWLAVLVAVALGGAQAGIGDVPADKPFLMKQREVL-RLFNKVKHEPNRY-KEQVELGNAYEPLNSLPRY-RNP
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MjaPPO ERNDVALQDLGTATSIPIGSAFSFFFLASHRRAAKDLCDFVMKTSQAKDLMVEAARVHGHVNESLFIFIYASFVILRKKELO
PlePPO ARPADARRLLGRAPSVPRAVGSFFFIRSTREAARDLCDVLMKTQNSTDLMQLAASVRRHVVENLFIFIYALSFTILRKQELR
PmPPO ERKDVTLQDLGTATSVPKGSAFFTAshRKAARDLCDFFMKTSGAEDLMQVAARVHGKVNETLFVVAISFVILRKKELR
TmPPO KIS--IPPFGEILELSRDENFSLFIPKHRRIAGRLIDIFLGMNRVDDLVSVAVYARDRVRNPYLFNYALSVAILHРDТQ
GmPPO NTA--LPDLSLPLQLYNDQSFVAKHRMAGKLIDIFINMRDVDDLSLCSYQCMRVNPYMFNYCLSVAILHРDТK
SbuPPO2 DLKQ--KPDLFSFTRPLGKRQKFSLFNNHIREIAARLIDIFMSTPTEELFIATCAYCKDRVNPLFQCYCFSVATQHРDТS
SbuPPO1 DIS--LPDLRIPMSLRGDEQFSLFPVHRRRIAGRLIDIFMGRVTDIDLQSIAYAHDRINPFLFNYALSVALLHRSDTK
EpiHc -----PLPAGIGKLLKGKGNLFSPFIFRKRREESTKVIPLFLDSKDYKGFLENAASLRPVVNEILFVYCFSVALYQSPHTT
EcaHcB -----PRLAGLVLGRGVLFSCFPEHHELIKEATQIYEVVIECEESFFELDLCQHAREYVNEGLYVYAVSVAILHРDСR
EcaHcC -----PKLAGIGIGRGRKIFCSPFCHEDLHEASRLIAVGAETDEFIDLCQHDFVNEALFVYSLSVAILHРDСR
EcaHcA -----ERLRNITTLGPNEFFSCFYEDHLEQAKRVYEVFCHAANFDFVSLAKQARSFMNSTLFAFSAEVALLHРЕDCR
EcaHcD -----PRLKGVGFPLRGTLFSCFHEELBAETIAEALVEAKNFDDFIALATNARAVVNEGLYAFAMSAILSРDDCN
EcaHcE -----ARLHHLGRPLQGELFSCFHEEDLEEATEYKLYTAKDFDEVINLAKQSRFTVNEGLFVYAVSVALLHРDСK
EcaHcF -----VRLRRVGRPLRGTLFSCFSEHLEKATELYQILYKADSFAADFHLAQQARDIVNEGLFVYSVSVAILHРDСR
EcaHcG -----PRLAGVGVPLRGTLFSCFHEKHLLEATKLFKVLYSAESFNDFLQLOLAREARDVVNEGLFAYAFSVAVIHRDСK
SpiHc1 -----PKKLIGIGILPKDQVFSLFDERTWDEVSEVLKRFMAAPTDFEDIKVAETLYPHVNEDLFLFGLSVAIVHРDAN
ScoHc1 -----DETKLKGLGILPQEIfSFLFDERTWEATKAEEFMEATDEFHFIQRADVLHRINEDMFMYALNVAVLHРDТR
ScoHc2 -----DESKLKGGLTLPREVFSLFDERNWAAKVVELLPEKTFREFHLADIHHRVNEDLFLYALSVAIHRPDCQ
HamHcA TAAHHMEEELNDHRLFLEQHHWFSLFNPQREEAALMIFDVLHMCKSWCFVDNAAFFRERMEGEFAYALYTAVIHSSELQ
PinHcA AAVETLMKEELNDHRLLEQRHWYSLFNFTRQRKEALMLFAVLNQCKEWYCFRSNAAYFRRERMEGEFVYALYVSVIHSKLD
PelHc1 AAAKTLQCELNDHRLLEQHHWFSLFNFTRQREEAALMIFTQLNQCKDWNCFLNNAAFFRERMEGEFVYALYVSVIHSKLD
CsaHc VAAKRLMKELNDHRLLEQKHWFSLFNFTRQREEAALMIFDVLHCKDWAFFQKMNNEGEFVYAIYAAVIIHSPLTE
PvaHc AAVQKLVQDLDLNDGKLLIEQKHWFSLFNFTRHNRNEALMIFDVLHCKDWAFFQKMNNEGEFVYALYVAVIHSLLAE
PinHcC ASVNTLIMDFKDGRLLQKHHWFSLFNFTRQREEAALMIFDVLHCKDWAFFQKMNNEGEFVYALYVSVIHSGLGE
SamHc APVKQLVRLYRAGSLLPRAIIFTLFDDTHREQMILLFESLLYANDWETFLRTAAWARDRVNEGQFVYALCVAVLHРЕDTR
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MjaPPO SVRLPSFVEVFPSPRFVPQETLAKAQIRINRMD-PNQREPVPVIEHGLEFGSGTHLKEHRLSYWREDYGLSVHHWHWHLIYP
PlePPO GVRPLPITLEVPFHKFIPMEDTLSMQVEVNRTP-PTATPLVIEYGFPEFTANQKAERHVSYWREDPGINSHHHWHWHLVYP
PmPPO SVRLPTMVEVFPSPRFVPQEAQSKAQLQINRMD-PNQTEPVIIEHGPEFGSGTHLKEHRLSYWREDYGINVHHWHWHLIYP
TmPPO DVDLPSFIESFPDKYVDAKVFQAQREQATVVP--EGSRAPIEI--PKDYTASDLEEEHRLAYFREDLGINLNHHWHWHLVYP
GmPPO GLQVPPVVETFPDKFMDPKVFRKARETTVNA-SGNRMPITI--PTNTYASNSEPEQRVAYFREDIGINLNHHWHWHLVYP
SbuPPO2 DFVPKP1AETFPQNFPIEPAVFKDARAEGEVVNPQGDRHIBI--PRNTYASDREEPQRLGYFREDIGVNSHHHHWHWHLVYP
SbuPPO1 NLDDLPSFQAQNPFKEVFDQSQVFKVREEAUTVPS-EGSRMPITV--PRDYTASDLPDHERLWYFREDLGINLNHHWHWHLIYP
EpiHc NLLAPP1WQTMYDFDQDRVENQINGIESTKGAPDKQPIQV--ILEPTGNRNPFFKLSYFREDIATAINSHHHWHWHVVIYP
EcaHcB GVSLPPVQEVPFDKFPVPSETLFKAFKEVRL--HPDDEIIV--DIEKTGNVKDPEYNLAYREDIGVNAHHWHWHLVYP
EcaHcC GISLPLP1QEIEFPDKFVPTVETYKAFKATR--HADKTFDDIIV--DMEATGTIMDFPEYLNAYREDIGINAHHHWHWHVVP
EcaHcA GVIVPPVQEVFADRFIPADSLSIKAFTLATT--QPGDESDIIV--DVKDGTGNILDPEYKLAYREDIGVNAHHWHWHVVP
EcaHcD GVVLPPIQEVFDPDRFVPAETINRALKDKVKS-DPNK--DTVV--PQKTNIDRPEYVNFREDIGVNSHHHHWHWHLVYP
EcaHcE GIVVPAI1QEIEFPDRFVPTETINLAVKEAN--HPDQ--DISV--HVVETGNILDEEYKLAYREDIGVTAHHWHWHVVP
EcaHcF GVTVPPIQEIEFPDRFVPAETVNQAVAKDLK--RQSSDDEVLL--EIQETGNILDPEHKLAYREDIGANAHHHWHWHVVP
EcaHcG GVTLPPIQEVFDPDRFVSETINLAMKEAKN--DPNS--DIVV--DQETGNILDPEYKLAYREDIGANAHHHWHWHVVP
SpiHc1 GVHVPVREHEVYVDPDKFLTDVLINIRKOIIKG--HKN--PVVK--DTHYYHNDPDPFRVDFYTEDLGMNSHHHHWHVLP
ScoHc1 GVQVPR1HKIYPDFKFLQDILVEVREKVNHG--EEK--PVVD--ATELHNQQLDPNQYRLSYFLEDIGMNSHHHHWHVVP
ScoHc2 GVQVPRVLDIYPDFKFLKEVHIIKEVSNEGAYLDK-PVID--ATEVSDNHLDPNQYRLSYFLEDIGMNSHHHHWHVVIHP
HamHcA GIVLPPPLYEITPHMFTNSEVIDKAYSAKMT---QK--PGTF--NVSFTGTTKKNRQORVAYFGEDIGLNIHHVTWHMDFP
PinHcA GIVLPPPLYQITPHMFTNSEVIDKAYSAKMT---QK--PGTF--NVSFTGTTKKNRQORVAYFGEDIGLNIHHVTWHMDFP
PelHc1 GIVLPPPLYEVTPHMFNTNSEVIDKAYSAKMT---HK--EGTF--NMSFTGTTKKNRQORVAYFGEDIGMNIHHVTWHMDFP
CsaHc HVVLPPLP1YEVTPLHFTNSEV1QAAVAKAKMT---QI--ASKI--KSHFTGSKSNPQORVAYFGEDIGMNTHHVTWHLEFP
PvaHc QVVLPPPLYEVTPHMFNTNSEV1EAYRAQKQ---QI--PGKF--KSSFTGTTKKNPQORVAYFGEDIGLNTHHVTWHMEFP
PinHcC GVVLPPLP1YEVTPHMFNTNSEV1EAYRAQKQ---NT--PSKF--ESHFTGSKKNPQORVAYFGEDIGLNTHHVTWHMEFP
SamHc GVVLPPLP1YEVTPLHFTNSEV1EAYRAQKQ---QE--PAV--HMNFTGTTIRNPQORVAYFGEDIGLGMNSHHHSQWHMDFP
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MjaPPO VGM-----GVDRDRKGELFYYMHQQQLIARYDLERLSLGLPVRVEKLDNWRVPIEDGYFPKLTIISNTGRAGWTRQDNTPKD
 PlePPO IEM-----NVNRDRKGELFYYMHQQMVARYDWERLSVNLNRVEKLENWRVPIDGYFSKLTANNSGRPWGTRQDNTPKD
 PmOPPO PAM-----GFDRDRKGELFYYMHQQVIARYDIERLCLGLPKVEKLDNWRIPIEDGYFPKMTVSISGRNWSRQDNTPKD
 TmOPPO FEAARE--VVAKNRRGELFYYMHQQIIARYNFERLCNKLKRATRFNDFKQAIQEAYFPKLDLSVASRSWPARVGQNQLKD
 GmOPPO FEAARE--IVKKDRRGELFYYMHQQIIARYNAERLCNGLGRVTRYSDFRAPIGEGYFPKLDLSQVASRSWPWRFANTVIRD
 SbuPP02 GNGPIE--VVKKDRRGELFYYMHQQIIARYNVERFCNGLAKTKVLNNVREPISEGYFPKIMSSLNRTYPSRITTKTLSD
 SbuPP01 FEAGDRA-IVNKDRRGELFYYMHQQVVARYNLERFSNNLARVTRLNDFRQPIAEGYFPKMDSLVASRAWPPRFDNTKLSD
 EpiHc VGSNPS--DKKINRKRGELFYYMHQQMLARYDAERLCNGMRRVKSLSLDYDELIPEGYPPRLHSKISCTEYASRQANTRMMD
 EcaHcB ATWRPEVVFHRIKDRKGELFYYMHQQMCARYDSERLSNGMAPMPFHNFHEPM-EGYSSHLLSSGNGMPYAFRHGRLKD
 EcaHcC SAWDSVKMMHRKDRKGELFYYMHQQMCARYDCERLSNGLARMIPIFHNFHEPL-EGYPHLSTSQTQGLPYAFRPEPMTLCD
 EcaHcA STYDPAFFGKVVKDRKGELFYYMHQQMCARYDCERLSNGLNRNMIFPQNLDEEL-EGYSPHLRSLSVGLSYGSRPAGMHLRD
 EcaHcD AFYDADIFGKIKDRKGELFYYMHQQMCARYDCERLSNGLQRNMIFPQNLDEEL-EGYSPHLRSLSVGLSYGSRPAGMHLRD
 EcaHcE ATWLPAMGRMMDRKRGELFYYMHQQMCARYDCERLSNGMRRMIPFSNFDEKL-EGYSAHHTLSVSGLPYAFRPDGCLHD
 EcaHcF PTWDASVMSKVKDRKGELFYYMHQQMCARYDCERLSNGLARMIPIFHNFDEKL-EGYSPHLTSVSLGINYASRPAGLHLRD
 EcaHcG ANWDAVTGKTDRKGELFYYMHQQMCARYDCERLSNGLTRMIPFHNFKEKL-EGYAPHLTSVSLGHLHYASRPAGLCLR
 SpiHc1 SIWTQDI-G-EKSCLKGEFYWMHRQMVARFDSELLSVLHPRISLDDWNKKVKVQYAPHLTIQRTGTYTMNRPNLEIED
 ScoHc1 AVWLPHK-GPRKDRKGELFYYMHQQMCARYDCERLSNNLPRTEPFENWDDPLEEGYAPHLTIHKTGYNMFRPEGLIVR
 ScoHc2 ATWLPKH-GGVKDRKGELFYYMHQQMCARYDCERLSNDLPRVPENWNPIDEGYSPHLIDKTYGKYAYRPQGVVIVHD
 HamHcA FWWKDSY-GYHLDRKGEFFWAHHQLTQRFDAERLSNLWDPVDELEH-WERIIHEGFAPH-TSYKGGEFPARPDNVFED
 PinHcA FWEDDSY-GYHLDRKGEFFWVHHQLTQRFDAERLSNLWDPVDELEH-WDRIIREGAFPL-TSYKGGEFPVRPDNIHFED
 PelHc1 FWEDDSY-GYHLDRKGEFFWVHHQLTQRFDAERLSNLWDPVDELEH-WDDIIHEGFAPH-TSYKGGEFPVRPDNIHFED
 CsaHc FWDDDSHENHHINRKGESFFWVHHQLTQRFDAERLSNLWDPVDELEH-WDDMIHEGFAPH-TMYKGYYFPSPRNVNFD
 PvaHc FWWNDAY-GHHLDRKGENDFWIHHQLTQRFDAERLSNYLDPVGELQ-WNKPIVDGFAPH-TTYKGYYFPSPRNVFED
 PinHcC FWEDDS-GRHLDRKGESFFWVHHQLTQRFDAERLSNHLDPVEELS-WNKAIDEGFAPH-TAYKGYYFPSPRNVFED
 SamHc FWWKEDEYGIRKERKGELFYYMHQQIARFDLERLSNDLPFVEPLY-WTERIKDGFYPQ-TTYRVGGEFPARPDNFAFHD

 MjaPPO FRRREIG-EFVIDTDELWIRSRLLDIAHQGFMDVDRKGKVPPIRDDVTSGQRGIDIILAEALEADEDLSINYPYFGSLHNFG
 PlePPO FRRNDAGLDFIDSMIEWRSRLMDIAHQGMYLNRNGERVPLSDNVITGKRGIDILGDAFEADAQLSPNYLFYGDLLHNTG
 PmOPPO LRRRELG-EFVIDTDELWIRSRLLDIAHQGFMIDRNGDKVPLRDDVTSGKRGIDILSEALEADAELSVPNFFYGDLLHNTG
 TmOPPO LNREVDQ-IKQDVDDLRKWSDRYIAIHQSATDERGRKIELTEN----EGIDILGNMIESS-ILSPNRTFYGDMHNMG
 GmOPPO IDRPVNE-IKIDVFLQLETWRDRFLQAIADSNAINMPNGRKVPLNEE----TGIDELGNLMESS-ILSLNRGYYGDLLHNMG
 SbuPP02 IDR-ED-SKLEIADLERWDRTRIVTAIDQFVVDTQKGQIPLDDK-KGIDILGDMMECT-ILSVNPTFYGGLHNNEG
 SbuPP01 LNRELDO-INLDIADLERWDRTRIFEAHQGVVUDESNGNRPVLDSEQ----RGIDILGNILESS-ITSVNRSLYGDLLHNMG
 EpiHc TLDN-----TVIELERFRERIEHAISVGYIELPDNTKTPLNNE----QGIDILADLIEAS-NYSLNGAYYGDLLHNTG
 EcaHcB MREV-----SVQDLERSRERLLDAINLGYVVDPNGLETPFLDEL---HGIDILGAIESS-NDSVNKSYYGSLLHNWG
 EcaHcC MHDV-----SVQDLERWRERLDAINLGEGTDPNGDEYALDET---FGIDVLGAIIESS-RDSKNRESYGSLLHNWG
 EcaHcA VREV-----DVQDMERWRTERIMEAIDLRRVISPTGEYIPLDEE---HGADILGALIESS-YESKNRGYYGSLLHNWG
 EcaHcD INDC-----SVQDMERWRERILDAIHTGLVTDHSHGKEIKLTEE---NGLNILGALIESS-HDSVNKPFYGTLHNWG
 EcaHcE LKDI-----DLKEMFRWRERILDAIDSQYIDNEGHQVKLDIV---DGINVLGALIESS-FETKKNLYYGSLLHNWG
 EcaHcF LVDF-----VDVQDMARWRERLFLSIDIGHVHQDGEIPLDAE---HGIDVLGALLESS-HDSLNDDDYYGGLHNNG
 EcaHcG LSEL-----EVQDVERWRDRILDAILYHHLNHWDRNNDVVLDAE---HGADILGAIIESS-SDSVNRRFYGSLLHNWG
 SpiHc1 LPEL-----TKGELMQWKNRIMEAIAHNRNITLKGPGPKLRTTPE---NGIDIFGHLIAAT-KNSTNRRYYGGLHNSYA
 ScoHc1 LPEL-----NKNKMRQWKSRLIHGIIHLNVLYAENGTKISLDNE---HGIDILGDAIESS-LLSVNRAFYGNITHCYA
 ScoHc2 LPNL-----PCKTMPEWKNRIMVGIRKGSLSISANTQVPLNNND---HGIDILGDVVESS-LLSVNRRFYGGLHNSYA
 HamHcA VDGV-----AHVRDMIIESRIRDAIAHGYVTDNHGDNINIRND---HGIDVLGDIIESS-VYSPNAQYYGALHNTA
 PinHcA VDGV-----AHVHDLEITESRIRDAIAHGYVTDSDGHTIDIRQP---KGIELLGDIIESS-KYSSNVQYYGSLHNTA
 PelHc1 VDGV-----AHVHDMEITENRIRDAIAHGYVTDSDGHTIDIRQP---NGIELLGDIIESS-MYSNPHYYGSLHNTA
 CsaHc VDGV-----ARVRDMLILESRSRIRDAIAHGYFTGRDGSVISIRDA---HGIDILGDIIESS-TYSPNPEYYGSLHNTA
 PvaHc VDGV-----ARIRDMLIVESRSRIRDAIAHGYVTDSEKGKHISDNE---KGIDILGDIIESS-LYSPNVQYYGALHNTA
 PinHcC VDGV-----ARVRDMSMTEDRIRDAIAHGYDALDGHISDIMS---HGIEFLGDIIESS-GYSANPGFYGSLHNTA
 SamHc LQNI-----KVQQMIDYTRRVRECISQQAVITETGDLNISSP---EGINVLGELIEPS-TGSKHREYYGALHNYG

 MjaPPO HDILAFSHPDNAHKEEGMVGMGDTATAMRDPVYRWHKFVDDTFQEQYKLMQRPYTTEELNFSGVKIEKVGVR---NDEA
 PlePPO HVLLAFCHNDNDSHREEIGVMGDSATALRDPVYRWHKFVDDIFQEQYKLTQPPYTMEDLSLPGVVLKDVGVR---NDQL
 PmOPPO HDILAFSHPDNAHKEEGMVVGVDGLTSRDPVFFRLHKLVDDLFQEQYKVTPQPYTDEFLPGPVRIERAGVVR---GNEA
 TmOPPO HVFISYVHDPDHRHLESFGVGMGDSATAMRDPVYRWHFVYIIDDIFQEQYKATLPRTYENQLNFPGBTVKVEVQVQ---GGSA
 GmOPPO HVFIAYSHDPDHRHLEYYGVGMGDSATAMRDPVYRWHFIDTIFNRRHKEERLDPYKESDLTFGNVIIITKLEVRIQSQKATP
 SbuPP02 HNAISYCHDPDARFLDEFGVGMGDTTAMRDPVYRWHFIDTIFNRRHKEERLDPYKESDLTFGNVIIITKLEVRIQSQKATP
 SbuPP01 HVFISYAHDPDHRHLESFGVGMGDSATAMRDPVYRWHFVYRHAFFDDMFQEHKTRLTSYLPQLQYDGTIGGIQVASD---GGP
 EpiHc HVMLATAHDPKFRNSSDGVMGFBQVTLRDPFLYRWHFKHIDNLLNQHKTLPQPYTDKELIADKIEKEASITSSQTKDPK
 EcaHcB HVIMSAVDDPDGRYQLNPGVMSDSTATSLRDPFIFYRWHRFIDDMFQEQYKSLTPYS-SQLQFKGVIVKSVCVRACK---TA
 EcaHcC HVLMANIVDPDGRYQTNPVGVMSDSTATSLRDPFIFYRWHRFIDDMFQEQYKRLKPYTKDQLSFTGVEIKNVKVHAAH---EE
 EcaHcA HVMMIAYIDHPDGRFRTGPVMTDTATSLRDPFIFYRWHRFIDNVPFQEQYKTLTPVSYTADLNFQGIRVSSISVEGP---AGA
 EcaHcD HVMIARIHDADGRYRTNPVGMDSTSLRDPFIFYRWHRFIDNVPFQEQYKHLPSYTHQQLDPFGVRIISRVTVRSK---VP
 EcaHcE HVMMARLQDPDHRFNENPGVMSDSTSRLRDPFIFYRHRFIDNIFQEQYKHLPSYTHQQLDPFGVRIISRVTVRSK---VP
 EcaHcF HVMMARIHDPDGRFRENPGVMSDSTSRLRDPFIFYRHRFIDNIFQEQYKATLPCYEEKDLEFSGVEIVNCTVNAK---AP
 EcaHcG HVMMARMTDPDRSFEENPGVMSDSTSRLRDPFIFYRWHRFIDNIFQEQYKATLPSYTADLNFQGIRVSSISVEGP---SQ
 SpiHc1 HVIAARIADSDEHMEEDNGAMYDVATSAARDPLFYSWHKFIDKLFTEQYMLTLPYTPYQLTWPDVVVVDGIHIEENLK-THEE
 ScoHc1 HVMAARIADPDGRYGEDNGVMHDVATSAARDPLFYSWHKFIDNIFLEYKDNLDPTQYELETWPDVVLDNTVTPKPHK-GDYD
 ScoHc2 HVIAKGVTDPQSTYGEKGNGAMYDVATSAARDPLFYSWHKFIDNIFQEHKEKTLQPYNKDELNFNPDVQVDSLINVAN-GTYE
 HamHcA HMLGRQGDPHGKFNMPGPVMEHFETATRDPSSFRLHKYMDNIFKEEHKDSLPPYTKADIEPTGVAVEEVEIVGQ---
 PinHcA HVMLGRQGDPHGKFNLPGPVMEHFETATRDPSSFRLHKYMDNIFKEHKTDSFPPTYTHEDLEFPGVSVDNAIDGH---
 PelHc1 HVMLGRQGDPHGKFDMPGPVMEHFETATRDPSSFRLHKYMDNIFKEHKTDSFPPTYTHEDLEFPGVSVDNAIDGH---
 CsaHc HVMLGRQGDPHGKFLPPGVLEHFETATRDPFAFPFRLHKYMDNIFREHKDSLPPYTKADIEPTGVAVEEVEIVGQ---
 PvaHc HVVLGRQGDPHGKFDLPPGVLEHFETATRDPSSFRLHKYMDNIFKEHKTDSFPPTYTHEDLEFPGVSVDNAIDGH---
 PinHcC HIMLGRQGDPTGKFDLPPGVLEHFETSTRDPSSFRLHKYMDNIFREHKDSLPPYTRDELEFNGVSIDSIAIEGT---
 SamHc HIMLGQITDPKRKFNMPPGVMEHFETATRDPFAFPFRLHKYIDNLFYEHKDLLPPRTSEELELPGTSIEEVQIDP---

MjaPPO DILHTGWKNKRGEASRGLDFNG---RPVLVELKHLDHEPFNYHLQLNNRGRTAKEVTVRVFLAPKFNARGLKMNFMEOQR
 PlePPO NTLTTGWSVREFEASRGLDFNSP---NPVILRITHLDHAPFTYHLQITNSHRKPSTVRIYMAPKHNERGLEMGFMEQR
 PmOPPO DVLLTGWNTRFEASRGLDFSG---KPVILRLTHLDNKPFDYH1QINNDLREPKEVTVR1YLAPKFGDREKEMDFMEQR
 TmOPPO NTLNTFWQQSDVDMSRGMDFQPR---GSVFVRFTH1QHQPFETYK1TVKNSNGNRKGTCR1FIAPKLDERGNPWLRYDQK
 GmOPPO NRFAFWQQSLSVLSQGLDFTPR---GSVLAKFTH1QHEEFTYVIEVNNTSGQSKMGTFRVFMAPKTDERGQPLAFEDQR
 SbuPPO2 NILLTYMEKSDVNLAAGLDFGPK---GNIYATFTH1QHAPFELYVIDVTNNDKPKKGTCR1FLCPKNDERGTPSLNLDQR
 SbuPPO1 NVLSTFWQSQSDVDSLRSGMDFVPR---GNVFARFTH1QHPTFTYTINVNNSSGAQRFGTVR1FLGPKTDERGQPMILLSDQR
 EpiHc NKLTYTFFDTKQLNLTKGLDFGNLLE---QSI1VT1TH1QHEEFTYNIKVNNNTGKDFGTFR1FMAPKNDDLD1PME1NEQR
 EcaHcB DVVTFANALLDISHAFNFGRT---GPVKVRYNH1LTHEPFTYK1VVDNAGTKTRATV1FLGP1EHDNLGNEFDIGRLR
 EcaHcC NVTTTVEDELLS1N1SHAFNFGRT---GAVKVRVYQHLDHEPFVYD1EVENHNSARLHGTCTR1FLAPVHDE1QNQLTPEELR
 EcaHcA NVVHTFIREDELELSHCLHFAKP---GSVRARYHHLDHESFSYI1SAQNNSNADQKATV1FLAPVHDE1ELGNNDISLDEQR
 EcaHcD NLIHTYSKDSLLELSH1G1NLK---GHIQVKEYHLDHEPYNYE1EVDRNRTGEARETCV1FLAPVHDE1GNRL1L1EEQR
 EcaHcE NVVTTFVMEKAEEELSY1GDFGSD---HSVKVLYRHLHDEPFVYNI1SENNSGGAKV1FLGP1YDELGNRLQ1EQQR
 EcaHcF NRVINTYMKESTLEMSH1S1FSK---GAVKVKVYQHLDHPFTYS1S1VENTTGDVKHATV1FLGP1QDELG1RNRL1NEQR
 EcaHcG NRVRTFLKQEEELVLSHG1NFGTE---HTVKVHYNHLDHEPFVY1TINVDNSSGAVK1HATV1FLGP1KCD1ELGN1ILEPNEQR
 SpiHc1 NMIHTYTSSTLRLSKGF1DFTKD---SEAK1V1EVTBHD1FVVY1ID1DNNAVEK1TAVL1FLAPVHDE1ERGHPL1L1KEQR
 ScoHc1 DEVHTYWEVDN1YLGKGF1DFTRK---TTATV1KVRH1QHEDYH1E1D1NNAGAK1KAV1FLAPVHDE1FVPVNEQR
 ScoHc2 NIVRTYVQNSLFL1AKGFTFT2---GSV1V1KVKH1N1HETFY1LN1EVTN1AL1EKKHGV1FLGA1V1D1ERGH1P1L1N1D1QR
 HamHcA --LNTFFDEFESLGN1AVD1ELEK1VHD1VA1SAYV1HRLN1HEEF1SY1K1LVQ1NNN1EGD1LATV1R1YLCP1V1D1NNH1I1P1SEG1H
 PinHcA --LTTFFDEFQY1S1LN1AVD1SG1EN1E1D1V1E1N1A1V1HRLN1HEEF1TY1K1TM1S1NNN1D1GER1LATV1FLCP1E1D1NN1G1I1T1L1DEAR
 PelHc1 --LTTFFDQFKY1S1LN1AVD1SG1EN1E1D1V1E1N1A1V1HRLN1HEEF1TY1E1EV1RN1HEE1Y1E1F1V1R1FLCP1E1D1NN1G1I1T1L1DEER
 CsaHc --LETFEDF1EY1S1LN1AVD1AEG1P1D1P1V1E1S1T1Y1V1P1R1N1H1KEF1T1F1R1D1V1E1G1--GAER1LATV1F1A1W1P1R1D1N1N1G1E1Y1F1D1E1G1
 PinHcC --LETFENF1EY1S1LN1AVD1T1D1V1D1A1V1E1I1L1Y1T1E1R1L1H1K1K1F1S1L1V1N1T1N1N1T1E1V1L1A1T1V1R1F1A1W1P1R1D1N1N1G1E1Y1F1E1G1
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 TmOPPO NMF1VELDKFTVNLKQ1G1NQ---1TRASSQ1S1V1T1P1F1F1T1F1R1N1L1R1P1R1Q1G1---ELAQ1NF1CG1GWT1QHML1P1K1G1P1PEG
 GmOPPO RLM1E1LDK1F1T1R1G1K1P1G1N1---1IRQ1SL1D1S1V1T1P1F1F1T1F1R1N1Q1A1R1P1G1D1P1G1---ATAAE1FD1FC1G1G1W1H1L1P1K1G1T1E1Q1G1
 SbuPPO2 QLAI1EMD1K1F1V1N1L1M1P1G1N1---1IRQ1SS1K1S1T1I1P1Y1T1F1R1P1G1D1P1Q1V1E1---ERLAE1F1R1F1C1G1G1W1H1L1P1K1G1P1PEG
 SbuPPO1 LLM1E1LDK1F1V1A1L1N1P1G1N1---1IRR1ST1D1S1V1T1P1F1F1T1F1R1N1L1D1A1N1P1A1G1---AEE1LF1N1F1C1G1G1W1H1L1P1K1G1L1P1E1G1
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 EcaHc E1T1N1E1L1D1K1F1K1A1T1L1D1P1G1K1N1---1V1T1D1H1R1N1R1T1V1T1V1F1V1Q1V1L1R1---E1G1---E1G1---V1A1G1---C1S1C1G1W1P1H1L1V1P1R1K1E1G1
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 PinHcA WFC1E1LDK1F1Q1K1V1P1G1S1P1---1I1E1R1S1K1D1S1V1T1V1P1D1S1P1F1S1Q1L1K1E1Q1A1D1L1S1Y1E1R1S1C1G1I1P1D1R1M1L1P1K1S1P1K1G1
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 PlePPO MTY1Q1L1F1M1L1T1D1E1K1Q1D1V1Q1P1A1---P1R1C1A1N1V1A1S1F1C1G1I1Q1D1A1Y1P1D1T1R1P1M1R1P1V1D1A1Y1A1R1L1---SN1M1V1Q1
 PmOPPO MVFQLFFMLTDY1A1D1K1V1S1P1G1---V1R1C1A1N1V1A1S1F1C1G1I1Q1D1A1Y1P1D1T1R1P1M1R1P1V1D1A1Y1A1R1L1---SN1M1V1Q1
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 GmOPPO YPV1V1Y1V1M1S1D1N1A1K1I1Q1D1V1---G1A1C1N1D1A1S1Y1C1G1I1R1D1K1Y1P1D1R1M1G1F1P1D1R1S1---ARN1LT1F1L1K1P1---N1M1A1T1
 SbuPPO2 MAF1D1F1V1M1S1D1Y1V1G1D1A1Q1T1N1P1D1C1S1D1S1F1C1G1I1Q1D1K1Y1P1D1N1R1T1M1G1F1P1D1R1L1---DART1L1K1D1L1T1N1A1F1S1N1M1S1T1
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 HamHcA MDF1D1L1F1V1A1T1D1E1K1V1Q1G1A1---D1E1H1G1T1D1H1P1D1H1P1---D1E1H1G1T1D1H1P1D1H1P1---R1E1V1F1H1D1V1---A1---N1N1V1T1
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MjaPPO DISIKFLADELKLN-----
PlePPO DITITFLTTASRSRHDGPI
PmoPPO DITIKFLGE--KLN-----
TmoPPO DVTIKFTNRTVRPKSRN--
GmoPPO DCTIKFTDAIREGTQRQ--
SbuPPO2 DITIRFNNDVIIDRKKN---
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EcaHcB EVTITHHQ-----
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EcaHcA HVTVRFQD-----
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EcaHcF DVKIQFKDQV-----
EcaHcG DVVIQYVGHE-----
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ScoHc2 DVVIKFTGEFLPPKGDI--
HamHcA HVKVFFKEEH-----
PinHcA VVKIVVHLEHHD-----
PelHc1 LVKIVHDPELRA-----
CsaHc DVVKVYHVVEDH-----
PvaHc QVKVFNHGEHIH-----
PinHcC TVKLYSHEGVVDGG-----
SamHc DVTITFKGSV-----
